

Spread of Disease by Fecal-Oral Route in Day Nurseries

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AS INCREASING numbers of women combine employment with child rearing, the need for child day-care nurseries also increases. Creation of facilities that bring infants, toddlers, and preschoolers together in close contact also creates health problems. Young children lack the hygiene of school-age children and are predisposed to disease spread by the fecal-oral route. Two recent outbreaks in day nurseries in North Carolina typify the problem and point to the need for close supervision of sanitary practices in these establishments.

Outbreak Number One

During a 2-week period, five young adults living in a mill town of about 15,000 people became ill with hepatitis. Investigation revealed that a day-care nursery was their only common place of association. The first person to become ill was a 23-year-old woman who worked as a cook and general helper in the nursery. She had consulted her physician because of malaise and anorexia of 3-week duration and was found to have a serum bilirubin level of 4.0 mg. per 100 ml. and a SGOT (serum glutamic oxaloacetic transaminase) level of 1,000 international units. Three other women and one man all of whom had children enrolled in the nursery became ill with

hepatitis within 3 to 14 days of the initial case. All denied exposure to common food, drugs, non-municipal water supplies, and association with one another outside the nursery.

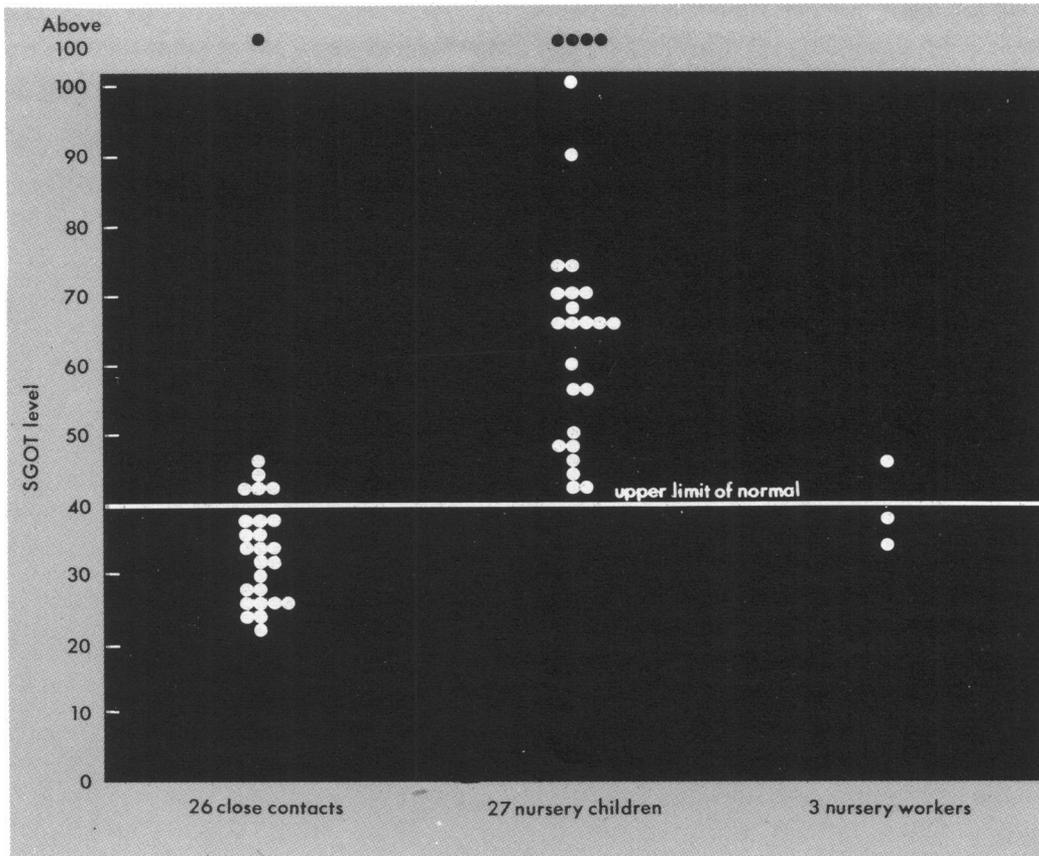
Inspection of the nursery revealed gross inadequacies in sanitary facilities, techniques of food preparation, and staff hygiene. Diapers were changed by workers who prepared food without regard for handwashing. Soiled diapers and food were stored in the same closet.

Two days after the diagnosis of the first case of hepatitis in the nursery cook, families of children enrolled in the nursery were offered prophylaxis with immune serum globulin (ISG). Twenty-one of the 27 children attending the nursery, four mothers, and three other nursery workers were given 0.01 cc. ISG per pound intramuscularly. Two of the mothers who received prophylaxis were among the five adults who became ill with hepatitis; in each person onset of symptoms occurred 2 weeks after receiving ISG.

Three weeks after the initial case was reported, blood samples were obtained from 27 nursery-school children, 26 of their household contacts (parents and siblings, other than the four patients), and three workers from the nursery (other than the cook). These people were also screened for histories and physical findings suggestive of hepatitis. None of the children or contacts had clinical evidence of disease. SGOT determinations (Technicon 340-colorimetric) made on the blood samples, however, indicated that 25 of the 27 children had levels greater than 40 units per ml. (normal is less than 40). In contrast only 5 of 26 close contacts and one of the nursery employees tested had SGOT elevations, as shown in the chart.

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SGOT levels of 56 asymptomatic persons associated with a day nursery



The presence of higher SGOT levels in children in the nursery than in their close contacts strongly suggests a high attack rate of subclinical hepatitis in the nursery. All seven children of the ill adults had levels greater than 40 units (range 49 units to 250 units).

Outbreak Number Two

During a 6-week period, 80 of 110 children enrolled in a day nursery were reported ill with diarrhea, vomiting, and fever. The children ranged

from 6 months to 13 years. They were cared for in a single-family frame house; three small rooms and a hallway were used to accommodate as many as 60 children during an 8-hour shift. More than half of the total floor space (700 feet) was occupied by cribs, cots, and high chairs, and as many as four infants occupied the same crib at the same time. Only one toilet and one washstand were available.

Histories were obtained from 92 children who attended the nursery and stool specimens for culture from 73 (see chart).

The number and percentage of patients with symptoms of shigellosis were as follows:

Survey results of shigellosis in children and workers in a day nursery

Results	Children	Workers
Total enrollment	¹ 110	9
Histories obtained	92	9
Number ill, by history	80	4
Cultures obtained	² 73	4
Culture positive for <i>Shigella sonnei</i>	37	3

Symptoms	Number	Percent
Diarrhea	80	100
Fever	60	75
Vomiting	48	60
Bloody diarrhea	4	5

Eighty children had had gastrointestinal symptoms during the preceding 6 weeks, and 37 had stool cultures positive for *Shigella sonnei*. Four of the nine workers who cared for children and also helped prepare meals had been ill, and three

¹ Approximate number.
² 5 cultures were obtained from asymptomatic children; 1 of these was positive for *S. sonnei*.

of these workers had stool cultures positive for *Shigella*. Six cases of secondary infections occurred among household contacts of these workers.

After the initial survey, jaundice developed in two of five teenage girls working in the nursery and in a 3-year-old girl attending the nursery, after their illnesses were diagnosed as hepatitis. All three had had stool specimens positive for *S. sonnei*. The municipal water supply was used and, because of the extended length of the epidemic, person-to-person spread rather than a common source was the implicated route of transmission.

Discussion

Shigellosis and hepatitis are easily spread in institutional settings in which levels of personal hygiene are low. Facilities for the mentally retarded are known to be endemic for both diseases. Researchers at the Center for Disease Control note that almost 15 percent of 5,744 *Shigella* isolates reported by residence in 1970 came from mental institutions (1). Forty-one percent of all isolates were from children 4 years old or younger.

Hepatitis is most commonly diagnosed in teenagers and young adults. But because the rate of subclinical disease is high in younger children, they are a potential reservoir of the disease. Sirrha and co-workers reported 22 cases of hepatitis among the nursing service personnel in a Wisconsin mental institution (2). A random survey of SGOT levels in asymptomatic children in the high incidence area of the same institution revealed that 34 of the 68 tested had levels greater than 40 units. Only one child was clinically ill. Krugman and co-workers at Willowbrook State School also found a high rate of anicteric cases in the same kind of closed population (3, 4).

Although problems with epidemic shigellosis in British schools have been described (5), schools and nurseries have not been identified as major repositories of fecal-oral disease transmission in this country.

In this report, we point to a potentially serious problem that is not well recognized. Day nurseries create environments where mixing of mobile toddlers and nontilet-trained infants make fecal-oral contamination a frequent occurrence. Nursery staff members can contribute to this spread if they go from changing diapers to preparing food without washing their hands properly.

Because many nurseries hope to make a profit and often operate within a limited budget, funds are not always channeled into improving sanitation facilities, and the tendency to overcrowd is always present. It is important for health workers to recognize these problems and to apprise nurseries of the health risks inherent in their operation. Health agencies should maintain a program of close supervision.

Summary

The increasing number of facilities providing day care for groups of infants and toddlers creates new health problems in the control of fecal-oral spread of disease. Two recent outbreaks in North Carolina day nurseries are described.

Five cases of infectious hepatitis in young adults were associated with a day nursery in which four of the patients had children enrolled, and one patient was a cook. None of the children were ill, but a survey revealed that 25 of the 27 children enrolled had SGOT (serum glutamic oxaloacetic transaminase) levels greater than 40 units per ml., compared with six of 36 family contacts.

During a 6-week period, 80 children enrolled in another nursery were reported ill and had symptoms of diarrhea, fever, and vomiting. Four of nine workers in the nursery were also ill. Three of the four workers and 37 children had stool cultures positive for *S. sonnei*. Two workers and one child also contracted hepatitis during this period.

In both outbreaks, overcrowding and poor sanitary practices and personal hygiene were found. Because day nurseries serve a population likely to transmit diseases by the fecal-oral route, close public health supervision is recommended.

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